

What is claimed is:

Claims:

1. A lightwave coupling device comprising:
 - a waveguide capable of propagating light of a first wavelength through internal reflection;
 - a photoluminescent medium positioned proximate to said waveguide, said
 - 5 photoluminescent medium capable of being selectively optically coupled to said waveguide for receiving light of said first wavelength and emitting light of a second wavelength in response to receiving light of said first wavelength; and
 - a coupling element operative for selectively optically coupling said photoluminescent medium with said waveguide to transfer light of said first
 - 10 wavelength from said optical waveguide to said photoluminescent medium.

2. The lightwave coupling device of claim 1 further comprising:
a flexible supporting layer carrying said photoluminescent medium, said flexible supporting layer movable between a first condition in which light of said first wavelength is transferred from said waveguide to said photoluminescent medium
5 and a second condition in which light of said first wavelength remains confined in said waveguide.
3. The device of claim 1 wherein said coupling element includes:
a first electrode positioned adjacent to said waveguide;
a second electrode positioned adjacent to said photoluminescent medium;
and
5 a voltage source capable of applying an actuation voltage to said first and second electrodes effective to electrostatically operate said coupling element between a first condition in which light of said first wavelength is transferred from said waveguide to said photoluminescent medium and a second condition in which light of said first wavelength remains confined in said waveguide.

4. The device of claim 1 wherein said photoluminescent medium includes a first side confronting said waveguide and a second side opposite said first side, and said coupling element includes:

a first electrode positioned adjacent to said photoluminescent medium;

5 a second electrode positioned adjacent to said second side of said photoluminescent medium; and

a voltage source capable of applying an actuation voltage to said first and second electrodes effective to electrostatically operate said coupling element between a first condition in which light of said first wavelength is transferred from

10 said waveguide to said photoluminescent medium and a second condition in which light of said first wavelength remains confined in said waveguide.

5. The device of claim 1 wherein said photoluminescent medium includes a first side confronting said waveguide and a second side opposite said first side, and said coupling element includes:

a first electrode positioned adjacent to said waveguide;

5 a second electrode positioned adjacent to said photoluminescent medium;

a third electrode positioned adjacent to said second side of said photoluminescent medium; and

a voltage source capable of applying an actuation voltage to said first, second and third electrodes effective to electrostatically operate said coupling

10 element between a first condition in which light of said first wavelength is transferred from said waveguide to said photoluminescent medium and a second condition in which light of said first wavelength remains confined in said waveguide.

6. The lightwave coupling device of claim 1 further comprising:
a cladding layer disposed on said waveguide, said cladding layer having a lower refractive index than said waveguide.
7. The lightwave coupling device of claim 6 wherein said cladding layer is disposed between said waveguide and said photoluminescent medium, said cladding layer including an aperture to permit transfer of light of said first wavelength from said optical waveguide to said photoluminescent medium.
8. The lightwave coupling device of claim 7 further comprising a coupler effective for decreasing the optical coupling between said photoluminescent medium and said waveguide, said coupler being aligned with said aperture and transmitting light of said first wavelength from said waveguide to said
5 photoluminescent medium.
9. The lightwave coupling device of claim 6 further comprising:
an optically opaque layer disposed on said cladding layer.
10. The lightwave coupling device of claim 1 wherein said waveguide includes a region between said waveguide and said photoluminescent medium effective to reflect said light of said first wavelength back into said waveguide.

11. The lightwave coupling device of claim 1 further comprising:
an optical source positioned adjacent to said waveguide, said optical source injecting light of said first wavelength into said waveguide.
12. The lightwave coupling device of claim 1 further comprising:
an optical source optically coupled to said waveguide, said optical source injecting light of said first wavelength into said waveguide.
13. The lightwave coupling device of claim 1 wherein said coupling element comprises an optical layer positioned between said waveguide and said photoluminescent medium, said optical layer effective for reducing transmission of light of said second wavelength from said photoluminescent medium to said
5 waveguide.
14. The lightwave coupling device of claim 1 further comprising:
an optical coupling path through which light of said second wavelength is transferred from said photoluminescent medium out of said lightwave coupling device.
15. The lightwave coupling device of claim 14 further comprising:
a reflective element positioned adjacent to said photoluminescent medium, said reflective element capable of reflecting light of said second wavelength toward said optical coupling path.

16. The lightwave coupling device of claim 14 further comprising:
a partially diffusely transmissive coating disposed on said photoluminescent medium between said photoluminescent medium and said optical path such that light of said second wavelength traverses said diffusely transmissive coating to reach said optical coupling path.
17. The lightwave coupling device claim of 1 further comprising:
a supporting substrate mechanically connected to said waveguide.
18. The lightwave coupling device of claim 1 further comprising:
one or more additional waveguides positioned adjacent to said waveguide, said additional waveguides partially optically coupled to said waveguide.
19. The lightwave coupling device of claim 1 wherein said coupling element comprises:
a liquid crystal layer positioned between said waveguide and said photoluminescent medium;
first and second electrodes positioned on opposite sides of said liquid crystal layer; and
a voltage source capable of applying a voltage to said first and second electrodes effective to modulate a refractive index of said liquid crystal layer to permit transfer light of said first wavelength from said optical waveguide to said photoluminescent medium.

20. The lightwave coupling device of claim 1 wherein said coupling element comprises:

a solid electro-optic layer positioned between said waveguide and said photoluminescent medium;

5 first and second electrodes positioned on opposite sides of said electro-optic layer; and

a voltage source capable of applying an actuation voltage to said first and second electrodes effective to modulate a refractive index of electro-optic layer to permit transfer light of said first wavelength from said optical waveguide to said

10 photoluminescent medium.

21. The lightwave coupling device of claim 1 wherein said coupling element comprises:

an electrowetting medium positioned between said waveguide and said photoluminescent medium;

5 first and second electrodes; and

a voltage source capable of applying an actuation voltage to said first and second electrodes effective to move said electrowetting medium between a first condition that permits transfer light of said first wavelength from said optical waveguide to said photoluminescent medium and a second condition in which light

10 of said first wavelength remains confined in said waveguide.

22. The lightwave coupling device of claim 21 further comprising:
a third electrode electrically connected to said voltage source, said third electrode participating in the movement of said electrowetting medium by receiving voltage from said voltage source.
23. The lightwave coupling device of claim 21 wherein said electrowetting medium operates as said photoluminescent medium.
24. A display comprising a plurality of said lightwave coupling devices of claim 1 arranged in a row and column electrode matrix.

25. A lightwave coupling device comprising:
- a waveguide capable of propagating light of a first wavelength; and
 - a plurality of photoluminescent features optically coupled to said waveguide layer, said plurality of photoluminescent features emitting light of a second
- 5 wavelength in response to light of said first wavelength.

26. The lightwave coupling device of claim 25 further comprising:
- an optical source optically coupled to said waveguide, said optical source injecting light of said first wavelength into said waveguide.

27. A device comprising:
- a optical source providing light of a first wavelength;
 - a photoluminescent medium receiving light of said first wavelength from said optical source, said photoluminescent medium emitting a second longer wavelength
 - 5 of light in response to said first wavelength of light along an optical path; and
 - a first color filter positioned between said optical source and said photoluminescent medium, said first color filter being substantially optically non-absorbing to said first wavelength of light and substantially optically absorbing to said second wavelength of light; and
 - 10 a second optical filter positioned in said optical path, said second optical filter being substantially optically absorbing to said first wavelength of light and substantially optically transparent to said second wavelength of light.

28. The lightwave coupling device of claim 27 wherein said optical source is substantially optically transparent and said first optical filter comprises an optical reflector positioned to the side of optical source facing away from said photoluminescent medium.

29. The lightwave coupling device of claim 27 wherein said first optical filter comprises:

an optical transmission filter positioned between said optical source and said photoluminescent medium.

30. The lightwave coupling device of claim 27 further comprising:

a gap with lower refractive index than said photoluminescent layer, said gap positioned between said first optical filter and said photoluminescent medium.

31. A display comprising a plurality of said lightwave coupling devices of claim 27 spatially arranged in a row and column matrix.